Coggins Gold Mine/Rich-Cog Mining Company, 1913-1926
State Route 1302
Albemarle
Montgomery County
North Carolina

HAER NC-4

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
Heritage Conservation and Recreation Service
Department of the Interior
Washington, D. C. 20243

HISTORIC AMERICAN ENGINEERING RECORD

Rich-Cog (Coggins) Gold Stamp Mill

NC-4

Location:	1.5 miles NE of Eldorado on SR 1302, Eldorado Twp., Montgomery County, Albemarle:]7.588850.3927200
Date of Construction:	1913-1925
Original Owner:	R. P. Richardson
Present Owner:	Dr. G. I. Richardson, Reidsville, North Carolina
Significance:	Representative example of gold stamp mill
Current Condition:	Deteriorated
Historian:	James T. Brenner, 1977.

In the 1920's, the gold extraction process could take one of two forms. It could be a relatively uncomplicated mechanical method or a combination of both mechanical and chemical procedures. The mechanical method involved extraction of the gold through various crushing and washing operations that used the heavy specific gravity of the metal to separate it from other materials. The steps comprising the process directly evolved from primitive pounding or crushing techniques, although updated and refined. By the mid-1920's, the efficiency of recovery for such methods was estimated at about 65%. [1]

Chemical extraction was a more efficient method of recovering gold, but also more costly. The procedure relied upon either a chlorine or cyanide treatment on the ore, which could be accomplished only at specially equipped plants. [2] Ideally, chemical treatment would be the final recovery step after mechanical processing.

Not all mining companies, however, could afford to construct chemical treatment plants. Consequently, those not so equipped stored the untreated residue of crushing and washing operations for eventual shipment to chlorination or cyanide plants. Because of cost considerations, the Coggins Mine, in Eldorado, North Carolina, never erected a chemical treatment plant and relied solely upon mechanical extraction methods. For this reason, the Coggins recovery method was both incomplete and inefficient. The process used at the mine, however, is an excellent example of mechanical gold milling operations.

For a brief time in 1925 and 1926, the Coggins Mine was the state's largest gold producer. Operated by the Rich-Cog Mining Company, the Coggins had been actively worked since 1913. The mine itself had been opened in 1882 and from that year until 1925 operated only intermittently. The principal periods of operation were: 1882-1890, 1910-1917, and 1924-1925. [3] During the intervening years, particularly between 1917 and 1924, the Rich-Cog Company operated the mine minimally. Shift reports dated for the summer of 1917 indicate that at least one shift worked in the mill processing previously mined ore. The above three periods of activity, however, mark the years of greatest development and production. This paper will, for the most part, be confined to the Rich-Cog operations of 1910-1917 and 1924-1925.

R. P. Richardson purchased the mine property in 1908. At that time the main shaft had been sunk to the 200 foot level and all the readily accessible gold had been mined and processed. Richardson formed the Rich-Cog Mining Company (an abbreviation of Richardson

and Coggins) to develop the mine further, and the company conducted development work until 1917. The mining company concentrated on the one known lense, or vein, of ore, and by 1917 had opened the 250', 350', 450', and 550' levels. [4]

Although Richardson owned the mine, the Rich-Cog Company did not immediately begin operations. In 1910, Richardson leased the land and mineral rights to the Whitney Company of Pittsburgh, Pennsylvania. Before a fire destroyed the surface plant in 1912, the firm had deepened the shaft to 226 feet. Mill returns for 1911 yielded about 0.19 ounces of gold to the ton. [5]

In that same year, Joseph Hyde Pratt, a North Carolina mining consultant and one-time state geologist, in the first of four reports on the Coggins, stated that $4820 in gold was recovered from 1698 tons of ore, an average of $2.84 per ton. An additional 35 tons of unprocessed ore were assayed at $49.00 per ton with an estimated total value of $1715. [6] The Coggins Mine, while not exceptionally rich, was nonetheless sufficiently profitable to warrant continued operations.

After the Whitney fire in 1912, Richardson reorganized the Rich-Cog Mining Company and reopened the mine. Throughout its existence, the Richardson company utilized mechanical recovery processes. As previously stated, the steps involved were improvements on earlier techniques. As the ore was brought from the mine, it was first crushed before being conveyed to the mill building. In the mill, the ore, in combination with water, was further reduced in size by the pounding action of the stamps, a milling machine. The crushed ore and water, a slime, flowed from the stamps over amalgamating tables where mercury, in a manner similar to iron and a magnetic, attracted the gold particles. From the amalgamating tables, the slime was piped onto concentrating tables where, in an operation similar to panning, the gold was caught in ridges, called riffles, on the table surface. The remaining slime was allowed to flow outside the concentrating room, where the water evaporated and the concentrates were stored for eventual shipment to a chemical treatment plant.

In 1913 the Rich-Cog Mining Company erected a mill which housed two stamping machines, and each machine carried five stamp heads. In addition, the mill contained two Wilfley concentrating tables and four sets of amalgamating tables. The company also built on the site an assay office, manager's office, and a pumping plant on the nearby Uhwarrie River. By late 1913, the company had sunk the main shaft

to 268 feet and had tunneled out 1000 feet of drifts and crosscuts. The capacity of the steam-powered plant was approximately 30 to 40 tons of ore per day. [7]

Between 1913 and 1916, the company sought no new veins. Richardson limited operations to developing the one known lense and had miners sink the shaft to the 550' level.

The mill operated 12 hours a day, six days a week. A 1934 report states that Richardson spent $380,000 on the property and that incompetent management handicapped the operation. The report adds that except for the infrequent examinations by Dr. Pratt, no expert advice was obtained. [8] In 1917, possibly because of the First World War, but more likely because of poor investment returns, Richardson halted operations. With the exception of keeping the mine free of water and working the previously mined ore, the plant was idle. [9]

In 1922, R. P. Richardson died and the heirs to the estate had a feasibility study conducted on the mine. W. Rowland Cox, a New York City consulting engineer, reported the results of his study on January 2, 1923. Among other things, the report listed the equipment at the Coggins:

> ...there is a steam power plant with a boiler capacity of 200 H.P., a double drum, steam driven hoist, two steam driven air compressors, a small jaw crusher, ... a ten stamp mill and a 55 K.W. D.C. generator. The generator is used for motor drives on the crusher, conveyors, [concentrating] tables, and for lighting throughout the plant. [10]

The Cox report recommended continued operation utilizing as much old machinery as possible and completely electrifying the plant. Based upon Cox's recommendations and Dr. Pratt's final report, the heirs decided to reactivate the mine. Pratt, in 1921, had asserted, "I still have great confidence in the future of the Coggins Mine and that there is a large quantity of good ore [remaining]." [11] In the fall of 1924, mining began again at the Coggins.

Earlier that year, the Richardson heirs incorporated the Rich-Cog Mining Company with R. M. Hanes as president; P. W. Richardson, vice-president; R. P. Richardson, Jr., secretary; and R. G. Stockton, treasurer. Charles Dickens continued as plant manager. No geologist was employed by the company.

Unlike the previous Rich-Cog Company, the new firm did no new

underground development work as such, but instead immediately began instituting measures to put the mine on a production basis. The heirs constructed a new engine house, enlarged the mill building, and purchased additional electrical and compressed air machinery for both underground and surface work. In all, the Rich-Cog Company invested $100,000 in the old Coggins Mine.

The operators did not expand the underground tunnels. Instead, miners brought ore to the surface that had been blocked out during previous periods of activity. As the Compressed Air Magazine stated:

> ...the present operators do not propose doing any more developmental work at this time, but will confine their efforts to the actual production of ore. It is estimated that between 100,000 and 110,000 tons are in sight and of this total about 70,000 tons are already blocked out. [13]

Pratt, in 1921, estimated the value of the ore "in sight" to be approximately $5.00 per ton. [14] The operators, however, limited their production to only the highest grade ore in the mine as assayed by Pratt.

The Rich-Cog Company entered into a favorable (for them) contract with the Carolina Power Company to bring electricity to the mine from Troy, North Carolina. Carolina Power, in exchange for riparian rights owned by the Estate, built a 14-mile transmission line. The power contract itself was on a sliding scale: 14¢ per kilowatt hour for the first thousand kilowatts and decreasing thereafter. In addition, one quarter of the charge was rebated by the power company until a total of $10,000 had been accumulated. [15]

The surface plant, with the exception of the hoisting engine, operated on electricity. The 50 H.P. Florey double drum hoist was air-driven. All underground equipment, including "Jackhamer" and "Stopehamer" drills and Cameron pumps were similarly operated by compressed air. A "Leyner" Number 50 sharpener kept the drill steels in condition. Two Ingersoll Rand Imperial "ARB" air compressors supplied air for the equipment. [16]

The mining and milling operations at the Coggins were essentially those described previously. The ore was brought to the surface through a 6' x 12' three-compartment shaft; two skipways and a ladderway. The one ton capacity skips were of the self-dumping type. The ore, after it was dumped from the skip, passed over a grizzly; the fine particles went directly to a conveyor belt while

the coarse ore was first put through a #28 Gates crusher. The crusher reduced the ore to a two-inch maximum and then dropped it on the belt. Three 12-inch conveyor belts carried the ore to a 250-ton capacity compartmented bin in the stamp mill building. [17] Manually operated deflectors, or grates, located along the third belt directed the ore to appropriate stamps.

The mill house was equipped with 50 stamps, 10 from the former Rich-Cog operation and 40 new stamps. The stamps were arranged five to a machine, with 30 stamp heads of 750 pounds and 20 of 850 pounds. Depending on the machine, each stamp, or stamp head, weighed either 750 or 850 pounds. Each stamp dropped five to seven inches 90 times a minute and crushed the ore to the consistency and size of sand. The ore, crushed in combination with water, flowed through a 40 mesh screen located at the front of the mortar box. A single stamp head required an average of 75 gallons of fresh water per hour. [18] Upon leaving the stamps, the ore passed over amalgamating tables which were equipped with mercury-coated copper plates. There were 10 such tables, one for each stamping machine. The tables measured 36 x 72 (?) inches. One source claims that such tables achieved an extraction efficiency of 87%. [19]

Workers cleaned the amalgamating plates daily. Using portions of discarded belting, mill workers scraped the amalgam (combined gold and mercury) from the tables and placed it in iron containers. The containers were taken to the assay office and retorted to free the gold and recover the mercury. [20]

From the table top, the combined water, stamped ore, and remaining gold flowed into a trough which piped it onto 10 Wilfley concentrating tables. [24] Takeoffs from a small electric motor provided the necessary "shaking" movement. Edward Hern, a former mill worker, states that both he and others stretched portions of wool blankets across the troughs situated along the sides and bottoms of the tables to catch any additional gold. [21]

The residue, or tailings, were piped outside the mill building where the water was allowed to evaporate. The tailings, also called concentrates, were held for eventual shipment for chemical processing.

Water used at the mine and mill came from the mine property. The pump station on the Uhwarrie River pumped water through a three-inch pipe approximately one mile to a water tower of unknown capacity at the plant site. Located in the pump house was a remote

controlled Union Centrifugal pump with a three-inch intake and discharge. The pump was inventoried and described after the mine closed in 1925:

> ...class U. Four stage motor driven. Complete with 50 H.P. motor, one starter, remote control, [and] operates on 2300 volts. [22]

Portions of the water line are visible on the site. Wood for construction and shoring also came from the mine property. Wood, if necessary, could serve as the fuel source for the intact but unused steam plant.

The Rich-Cog Company invested $100,000 in the Coggins Mine. Gold production began in October, 1924, but by late spring, 1925, the company ceased operations. Reasons for the failure range from inept management and poor plant design to low-grade ore and incomplete extraction methods. A 1934 report states:

> [the] construction program and renewed mining operations was [sic] supervised by the former inexperienced manager [Charles Dickens]. Failure to employ competent management resulted in a mill of improper design and an operating loss even when treating the best ore in the mine. [23]

The best ore in the mine, the report added, was not of the quality originally thought. To hinder further the mine's production, the tailings were never chemically treated to complete the extraction process. Estimates of 90% amalgamation and concentration effectiveness were both inaccurate and overly optimistic.

At some point after the cessation of operations, the Rich-Cog Company inventoried their machinery and equipment. In addition to the centrifugal pump, the Rich-Cog Company had located at the Coggins:

I. A 40 head stamp mill consisting of eight batteries with 5 heads each (750 lb. and 850 lb. stamps) complete with shafts, pulleys, automatic feeders and timbers. [The inventory excludes the original ten-stamp mill.]

II. One cable drum hoist operated either on compressed air or steam, complete with two rolls of cable, 700 feet each.

III. One #28 jaw Rock crusher, 100 ton daily capacity.

Made by Gates Iron Works, Chicago, Illinois. [24]

Equipment for subsurface operations included:

IV. One Worthington water pump. 5" intake and 4" discharge. Operates on steam or air.

V. One Cameron No. 7 suction pump (sinking pump). 3 1/2" intake, 2 1/2" discharge.

VI. One Cameron No. 3 [pump] - 2 1/2" suction, 2" discharge. Steam or air operated.

VII. One Cameron No. 2 [pump] - 1 1/2" suction, 1 1/4" discharge.

VIII. 4, one ton capacity all metal ore cars [skips]. [25]

Miscellaneous equipment included:

IX. 15,000 feet No. 8 copper wire. [26]

After 1925, the Coggins Mine remained virtually inactive. In 1928, the Richardsons leased the property to two men from Philadelphia, one of whom was a mining engineer. In 1929, the Pennsylvania men unwatered and examined the mine, but were unable to make a $25,000 payment to the Richardsons and consequently lost the lease. In 1934, John M. Rogers, a New York mining engineer, unwatered and sampled the mine. Even though the price of gold had risen to $33.00 an ounce, the engineer considered a resumption of mining at the Coggins to be impractical.

During the periods of operation, the mine property consisted of approximately 80 acres divided into three tracts. The first tract, or "Mining Tract," was the most significant and contained the surface plant, outbuildings, and shafts and tunnels. A second, 20-acre tract contained lumber. The third, one-acre tract, located on the Uhwarrie River and known as the Pump Station Tract, contained the pump house. [27]

The surface plant as it remains contains vestiges of both Richardson periods of activity. All buildings were of wood frame construction and, with the exception of the mill house and portions of the compressor room, have fallen in. Little remains of the

equipment: ten stamps, one conveyor belt, and the vandalized c. 1913 generator are in the mill house. Twisted tracks and, supposedly, a skip are underneath the shaft head. Concrete mounts are visible in all the buildings. The majority of the machinery has been either sold or scrapped, or stolen. [28] Underground, water rises to within 30 feet of the surface in the main shaft.

The site at one time included a manager's house, an assay office, a blacksmith shop, a changing shed (for miners to change clothing), a supply house, a powder house, a pump house, a water tower, approximately 10 dwelling houses, a large boarding house, a non-company store, and a well. The boarding house, water tower, and all but one of the dwelling houses no longer exist. The remaining buildings are more or less intact.

During the height of the 1924-1925 operation, the mine employed 52 men. [29] The plant operated in shifts; the mill building ran continuous 10-hour shifts and, underground, three shifts of eight hours each. No living miners have been located but two mill operators, Edward Hern and Ratio Canford, live in the immediate Eldorado vicinity. Neither, however, is extremely cogent, and caution must be exercised in using their accounts.

The Coggins Mine is important in the fact that it was, at one time, a large-scale operation. In 1924 it was the state's largest gold producer. But more importantly, no Northern or foreign investments financed the mine. The significance, however, is its typicality. The methods and processes used at the Coggins Mine were also used at other contemporary North Carolina gold mines. The stamp mill and, indeed, the entire surface plant readily illustrate the once common method of mechanical gold extraction.

NOTES

[1]Discussions with both Dr. Richard Knapp of the North Carolina Division of Archives and History, and Harold Nash of the Karnapolis City Schools, indicated that estimates of 90% recovery efficiency are exaggerated.

[2]For a complete description of chemical treatments of gold ore see: Richard F. Knapp, "A Preliminary Report on Mining Technology and Machinery at the Reed Gold Mine and Other Cold Mines of North Carolina," (Typewritten, 1973), p. 188. Hereafter cited as Knapp, "Report."

[3]W. Rowland Cox, "Notes on the Property of the Rich-Cog Mining Company, Montgomery County, North Carolina," (Typewritten, 1923), p. 1. Hereafter cited as Cox, "Report."
Also, John M. Rogers, "Report on Rich-Cog Mining Company," (Typewritten, 1934), p. 6. Hereafter cited as Rogers, "Report." Both reports are of and to the Rich-Cog Mining Company.

[4]Rogers, "Report," p. 5.

[5]J. T. Pardee, "Preliminary Reports on Gold Deposits in North Carolina and South Carolina," (Typewritten, 1935), p. 35. Hereafter referred to as Pardee, "Report."

[6]Joseph H. Pratt, "Report on the Coggins Mine," Economic Paper Number 34, N. C. Geol. and Econ. Survey (Chapel Hill, 1911), p. 59.

[7]_____, "Report on the Coggins Mine," (Typewritten, 1916), p. 1, p. 22.

[8]Rogers, "Report," p. 6.

[9]E. H. Paull, "Revival of Gold Mining in North Carolina," Compressed Air Magazine, Vol. XXX, No. 1 (January, 1925), p. 1111. Hereafter referred to as Paull, "Revival of Mining."

[10]Cox, "Report," p. 16.

[11]Joseph H. Pratt, "Report on the 450' and 550' Levels of the Coggins Gold Mine." Quotation is from the cover letter accompanying and included in the report. (Typewritten, 1921.) Hereafter cited as Pratt, "1921 Report."

[12]Paull, "Revival of Mining," p. 1112.

[13]Ibid., p. 1112.

[14]Pratt, "1921 Report," p. 1.

[15]Rogers, "Report," p. 8.

[16]Paull, "Revival of Mining." Both compressors are more completely described in the article.

[17]Ibid., p. 1112.

[18]Knapp, "Report," p. 188.

[19]Paull, "Revival of Mining," p. 1112.

[20]Edward Hern, interview conducted June 16, 1977, at Eldorado, North Carolina.

[21]Ibid.

[22]Anonymous, "Inventory of Machinery and Equipment of the Rich-Cog Mining Company, located at Eldorado, North Carolina," (Typewritten, date unknown), p. 1. Hereafter cited as Anonymous, "Inventory."

[23]Rogers, "Report," p. 6.

[24]Anonymous, "Inventory," p. 1.

[25]Ibid.

[26]Ibid.

[27]Rogers, "Report," p. 4.

[28]Ten stamps, a concentrating table, an amalgamating table, three pumps, and the jaw crusher are in the Reid Gold Mine Museum near Concord, North Carolina.

[29]Paull, "Revival of Mining," p. 1112.

BIBLIOGRAPHY

Anonymous. "Inventory of Machinery and Equipment at the Rich-Cog Mining Company located at Eldorado, North Carolina." Date unknown. (Typewritten.)

Cox, W. Rowland. "Notes on the Property of the Rich-Cog Mining Company, Montgomery County, North Carolina," 1923. (Typewritten.)

The Cox report is, in reality, a feasibility study presented to the Richardson heirs. The report is fairly comprehensive and describes not only the geology, development work, and topography of the mine, but also the condition and types of machinery at the site. The report, however, seems to have been based upon rather casual notes, as certain statements do not entirely agree with other reports.

Hern, Edward. Eldorado, North Carolina. Interview, 16 June 1977.

Although Hern is one of the few surviving mill workers, his testimony should be regarded lightly. At times his recollection would be extremely hazy, and at other times he would embellish the account.

Knapp, Richard F. "A Preliminary Report on Mining Technology and Machinery at the Reed Gold Mine and Other Gold Mines in North Carolina." Raleigh, 1973.

Knapp, of the North Carolina Division of Archives and History, wrote this report as an introduction to mining techniques and machinery used in North Carolina from 1799 to the present. The report is extremely informative and contains numerous illustrations.

Nash, J. Harold. Kannapolis City Schools, Kannapolis, North Carolina. Interview, 14 June 1977.

Mr. Nash has an outstanding knowledge of North Carolina gold mining. His suggestions and advice have been invaluable.

Pardee, J. T. "Preliminary Reports on Gold Deposits in North Carolina and South Carolina." Abstract, 1935.

While this report is not as detailed as those in the Richardson

holdings, it does provide some information on the Coggins Mine before 1913.

Paull, E. H. "Revival of Gold Mining in North Carolina." Compressed Air Magazine, XXX, 1 (January, 1925).

Not only does this account describe the machinery at the Coggins during the 1924-1925 operation, but it also contains numerous pictures. It is perhaps the best comprehensive source available.

Pratt, Joseph Hyde. "Report on the Coggins Mine." Economic Paper No. 34, North Carolina Geological and Economic Survey, 1911.

The report is primarily a geological report, but does include some brief descriptions of the process used at the mine.

_____. "Report on the Coggins Mine." Chapel Hill, 1916. (Typewritten.)

Similar to 1911 report.

_____. "Report on the 450' and 550' Levels of the Coggins Gold Mine." Chapel Hill, 1921. (Typewritten.)

This report is similar to the 1916 report and is a supplement to both the 1911 and 1916 reports.

Rogers, John M. "Report on the Rich-Cog Mining Company." New York, 1934. (Typewritten.)

This report is, in essence, a geological report on the possibility of additional gold in the Coggins Mine. Although the report discourages reopening the mine, it does, however, describe the surface plant and gives a history of the mine from 1882 to 1934.